

a position sensor operable to provide sensing of the position of the catheter distal end.

- ~~70~~². The system for percutaneous treatment of Claim ~~69~~¹, further including an optical waveguide for energizing the active portion.

-- ~~71~~³. The system for percutaneous treatment of Claim ~~70~~², further including an ECG monitor for synchronizing with the position sensor.

a - ~~72~~⁴. The system for percutaneous treatment of Claim ~~71~~³, further including a reference sensor to correct for breathing motion or patient movement.

-- ~~73~~¹⁰. The system for percutaneous treatment of Claim 69, wherein the position sensor is operable to provide sensing of the position of the catheter distal end by use of magnetic fields.

b - ~~74~~². The system for percutaneous treatment of Claim 73, wherein the position sensor includes at least two non-coplanar magnetic elements.

-- ~~75~~⁷. The system for percutaneous treatment of Claim ~~74~~¹⁶, further comprising a plurality of external magnetic elements for placement outside the patient.

-- ~~76~~⁴. The system for percutaneous treatment of Claim ~~75~~⁷, wherein the external magnetic elements establish magnetic fields which are sensed by the position sensor.

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 - 77. The system for percutaneous treatment of Claim 76, wherein the plurality of external magnetic elements establish different magnetic fields sequentially and the position sensor is operable to sense the different fields.

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 -- 78. The system for percutaneous treatment of Claim 77, wherein the plurality of external magnetic elements are three coils, the coils being sequentially energized.

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 -- 79. The system for percutaneous treatment of Claim 69, wherein the position sensor includes at least one magnetic element and further comprises a plurality of external magnetic elements for placement outside the patient.

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 -- 80. The system for percutaneous treatment of Claim 70, wherein a chamber of the patient's heart is treated.

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 -- 81. The system for percutaneous treatment of Claim 74, wherein the position sensor includes wires for carrying position signals between the position sensor and the catheter proximal end.

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 -- 82. The system for percutaneous treatment of Claim 70, wherein the catheter comprises means for rotating or deflecting the distal end of the catheter.

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 -- 83. A method of treating a patient's heart comprising the steps of:

(a) percutaneously inserting a catheter into a heart of a patient, the catheter having a proximal end and a distal end, an

• active portion at the distal end of the catheter for applying laser energy, and a position sensor;

(b) sensing the position of the catheter distal end using magnetic fields and the position sensor;

(c) using the position sensor to reference the catheter distal end;

AI (d) positioning the catheter such that its distal end is adjacent tissue of the heart to be treated; and

(e) applying laser energy from the active portion to the patient's heart tissue.

-- 84¹¹⁴ The method of Claim 83¹¹³, including utilizing an ECG monitor for synchronization with the position sensor.

-- 85¹¹⁵ The method of Claim 84¹¹⁴, including utilizing a reference sensor to correct for breathing motion or patient movement.

-- 86¹¹⁴ The method of Claim 83¹¹³, wherein laser energy is applied to the active portion through an optical waveguide --.